

REMARKS

Claims 1 through 14 are pending in the above-identified patent application.

In the above-referenced Office Action, **Claims 1 - 3, 5 - 9, and 12 - 13** are rejected under **35 U.S.C. §103(a)** as being unpatentable over U.S. Patent **5,990,605** to *Yoshikawa* in view of U.S. Patent **5,296,388** to *Kameyama*.

Claim 4 is rejected under **35 U.S.C. §103(a)** as being unpatentable over *Yoshikawa* in view of *Kameyama* and in further view of U.S. Patent **5,527,730** to *Kayaoka*.

Claims 10 and 11 are rejected under **35 U.S.C. §103(a)** as being unpatentable over *Yoshikawa* in view of *Kameyama* and in further view of U.S. Patent **4,007,474** to *Yagi*.

Claim 14 is rejected under **35 U.S.C. §103(a)** as being unpatentable over *Yoshikawa* in view of *Kameyama* and in further view of U.S. Patent **5,319,220** to *Suzuki*.

The Applicant respectfully traverses the Examiners rejections and objections as set forth in the above mentioned Office Action. Moreover, the Applicant respectfully requests reconsideration of the application in view of the foregoing amendments and the discussion that follows. The status of the Claims is now as follows: Claims 1 through 14 are pending in the present application; and Claims 1, 5, and 7 have been amended; and Claims 15 through 39 are withdrawn from consideration. Accordingly, Claims 1 through 14 are active in the present application. The Applicant believes that all claims as amended herein are enabled by the Specification. No new matter was introduced in amending the Claims.

THE PRESENT AMENDMENT

Prior to proceeding to a detailed discussion of the merits of the outstanding rejections and objections to the Claims, it will first be helpful to summarize the changes made by the amendments set forth herein. The Claims as amended herein are set forth in the above **CLAIMS LISTING**: (see **Page 3** herein).

a. Amendments to the Claims

Applicant has amended **Claims 1, 5, and 7** to particularly point out and to distinctly claim the subject matter the Applicant regards as her invention.

i. Amendments to Independent Claim 1

Claim 1 as amended herein distinctly recites that the high emission electron emitter **10** injects electrons **e-** in a vacuum towards a collection electrode and that the electron injection layer **1** is biased to a first voltage, the n-type heavily doped region **8** is biased to a second voltage that is at a higher positive potential relative to the first voltage, and that the collector electrode is biased to a third voltage that is at a higher positive potential relative to the second voltage so that electrons **e-** are injected into the vacuum towards the collector electrode. Support for the amendments to independent Claim 1 can be found in the Specification as originally filed. For example, Page 1, lines 23 - 27, **FIG. 1** of the Drawings, Page 7, lines 6 - 11 and lines 26 - 32, and **FIG. 2a** and **FIG. 3** of the Drawings. No new matter was added in amending Claim 1.

ii. Amendments to Claim 5

Claim 5 has been amended to specifically recite that the ohmic contact **9** is biased to the first voltage. Support for the amendments to Claim 5 can be found in the Specification as originally filed. For example, Page 12, lines 30 - 34, Page 13, lines 1 - 15, and **FIG. 3** of the Drawings. No new matter was added in amending Claim 5.

iii. **Amendments to Claim 7**

Claim 7 has been amended to specifically recite that the top electrode **7** is biased to the second voltage. Support for the amendments to Claim 7 can be found in the Specification as originally filed. For example, Page 7, lines 1 - 11 and lines 26 - 32, Page 9, lines 19 - 31, and **FIG. 2a** and **FIG. 3** of the Drawings. No new matter was added in amending Claim 7.

The Applicant respectfully submits that **Claims 1, 5, and 7** as amended herein are not anticipated by, are not obvious, nor are unpatentable in view of the prior art of record and overcome the Examiners rejections under the **35 U.S.C. §103(a)**. Therefore, the rejection of **Claims 1 - 14** under **35 U.S.C. §103(a)** ought to now be withdrawn. Because Claims 2 - 14 depend from independent Claim 1 and inherit all of its limitations, the Applicant respectfully submits that Claims 2 - 14 are not anticipated by, are not obvious, nor are unpatentable in view of the prior art of record and overcome the Examiners rejections under the **35 U.S.C. §103(a)**.

Accordingly, the Claims as amended herein are patentably distinct over the prior art of record and are enabled by the Specification and ought to now be allowed.

ARGUMENT

A. CLAIMS REJECTION UNDER 35 U.S.C. §103(a)

The Office Action mailed **24 April 2003** states: **Claims 1 - 3, 5 - 9, and 12 - 13** are rejected under **35 U.S.C. §103(a)** as being unpatentable over U.S. Patent **5,990,605** to *Yoshikawa* in view of U.S. Patent **5,296,388** to *Kameyama*; **Claim 4** is rejected under **35 U.S.C. §103(a)** as being unpatentable over *Yoshikawa* in view of *Kameyama* and in further view of U.S. Patent **5,527,730** to *Kayaoka*; **Claims 10 and 11** are rejected under **35 U.S.C. §103(a)** as being unpatentable over *Yoshikawa* in view of *Kameyama* and in further view of U.S. Patent **4,007,474** to *Yagi*; and **Claim 14** is rejected under **35 U.S.C. §103(a)** as being unpatentable over *Yoshikawa* in view of *Kameyama* and in further view of U.S. Patent **5,319,220** to *Suzuki*. The Applicant respectfully traverses the rejections.

1. Standards Governing the Obviousness Determination

Obviousness under **35 U.S.C. §103** is based on the underlying factual inquiries set forth in *Graham v. John Deere*: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art; and (4) objective evidence of secondary considerations. *Bausch & Lomb v. Barnes/Hydrocurve*, 796 F.2d 443 (Fed. Cir. 1986).

Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). The appropriate inquiry is *not* whether it would have been obvious to substitute an element, or modify the prior art, in a manner advanced by the Examiner, because that is not the appropriate test of patentability. See e.g., *In re Fine*, 837 F.2d 1071, 1075 (Fed. Cir. 1988).

Rather, to meet its burden of showing prima facie obviousness, the PTO must necessarily show some objective teaching that would lead one of ordinary skill in the art to combine the relevant teachings to solve the problem confronting the applicant. *In re Fine, supra*.

Further, "it is impermissible within the framework of §103 to pick and choose from any one reference only so much of it as will support a given position to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one skilled in the art." *Bausch & Lomb, 796 F.2d at 448*. A reference applied against an applicant must be considered *in its entirety*, including those portions of the reference that teach away from an applicant's invention. *Id.*

i. **Rejection of Claims 1 - 3, 5 - 9, and 12 - 13**

In support of the rejection of independent **Claim 1**, the Examiner contends that *Yoshikawa* discloses (Fig. 2), an electron injection layer #12 including a front side surface in contact with a high porosity material #13a, and a contact layer of low porosity material #13b in contact with the a high porosity material #13a and including an interface surface. However, *Yoshikawa* fails to teach an n-type heavily doped region extending inward of the interface surface. On the other hand, *Kameyama* teaches a n-type heavily doped region extending inward of an interface surface (Col. 8, lines 20 -22) to improve emissivity of the emitter (Fig. 3 #116).

In order for a prima facie rejection under **35 U.S.C. §103(a)** to stand, the combination of *Yoshikawa* and *Kameyama* must teach, suggest, or motivate one of ordinary skill in the art to arrive at Claim 1 as presently amended. As amended herein, *Kameyama* does not teach and in fact teaches away from the structure of Claim 1.

For example, in *Kameyama*, the objective of the invention is to create a semiconductor structure for a bipolar of field effect transistor (see the Abstract, Col. 1, lines 1 - 15, Col. 5 lines 16 -25, lines 35 - 40, and lines 50 - 62, Col. 6, lines 35 - 39, and Fig. 3). Clearly, what *Kameyama* teaches is related to the transistor art for a

bipolar transistor having a base, collector, and emitter (see references to NPN transistors in Col. 6 - Brief Description of the Drawings). Accordingly, in *Kameyama*, the n-type heavily doped region comprising the emitter #116 is merely one of the three nodes of a bipolar transistor.

In sharp contrast, in Claim 1 of the present application, the heavily doped region 8 is a surface for the emission of electrons e^- that are injected into a vacuum. The electrons e^- are injected into the vacuum towards a collector electrode because a positive potential gradient between the heavily doped region 8 and/or the top electrode 7 creates an electric field that attracts the electrons e^- towards the collector electrode.

Therefore, the operation of the high emission electron emitter 10 of the present application requires a vacuum and a collector electrode. Those elements are not taught or suggested by *Kameyama*. Moreover, the structure taught by *Kameyama* is inoperable to inject electrons into a vacuum because in *Kameyama*, the n-type heavily doped region comprising the emitter #116 is covered by additional layers of material (#108, #110B, #114, #118) to form the bipolar transistor without a vacuum that separates a collection electrode from the emitter #116. Furthermore, once the bipolar transistor of *Kameyama* is inserted into a circuit and the emitter node is electrically connected with the circuit, electron flow would be into the circuit or from the circuit and not into a vacuum.

It should be further noted that the collector electrode #2, transparent electrode #1, and the fluorescent layers #3R, #3G, and #3B for the electron emission device of *Yoshikawa* face a vacuum space (Col. 4, lines 55 - 65, Col. 8, lines 45 - 65, Col. 9, lines 38 - 46, and Fig. 2). Nothing in the four corners of *Kameyama* teaches or motivates one of ordinary skill in the art to remove all of the above mentioned layers from the emitter #116, add a collector electrode, and impart a vacuum between the collection electrode and the emitter #116.

In conclusion, both *Kameyama* and *Yoshikawa* fail as **35 U.S.C. §103(a)** prior art, because taken alone or in combination, they do not teach or suggest ALL the limitations of independent **Claim 1** of the present application. Moreover, in regards to the **§103(a)** rejections of dependent **Claims 2 - 3, 5 - 9, and 12 - 13**, ALL of the claim limitations of independent **Claim 1** must be taught or suggested by *Kameyama* and *Yoshikawa*. Moreover, if **Claim 1** is nonobvious over *Kameyama* and *Yoshikawa*, then any claims depending from **Claim 1** are also nonobvious over *Kameyama* and *Yoshikawa*. **MPEP 2143.03 (2002)**.

For all the reasons set forth above, both *Kameyama* and *Yoshikawa*, taken individually or in combination, fail to teach and suggest all the limitations set forth in **Claim 1**. Therefore, both *Kameyama* and *Yoshikawa* fail as **35 U.S.C. §103(a)** prior art and the Applicant respectfully submits that the Examiner has not met the legally required burden of proving a prima facie case of obviousness.

Accordingly, the Applicant respectfully submits that **Claim 1** is nonobvious in view of *Kameyama* and *Yoshikawa* and is patentably distinct over the prior art of record, and is in condition for allowance. Because **Claims 2 - 3, 5 - 9, and 12 - 13** depend from independent **Claim 1** and incorporate all of the limitations of **Claim 1**, **Claims 2 - 3, 5 - 9, and 12 - 13** are also nonobvious in view of *Kameyama* and *Yoshikawa*, are patentably distinct over the prior art of record, and are in condition for allowance. Therefore, the rejection of **Claims 1 - 3, 5 - 9, and 12 - 13** under **35 U.S.C. §103(a)** ought to now be withdrawn.

ii. **Rejection of Claim 4**

In the rejection of **Claim 4**, the Examiner contends that *Kayaoka* teaches titanium silicide and titanium nitride are useful for their electron donative properties (Col. 23, lines 39 -48). For the same reasons argued above for the **35 U.S.C. §103(a)** rejection of independent Claim 1, Claim 4 inherits all of the limitations of Claim 1.

Because the cited combinations of *Kameyama* and *Yoshikawa* in further view of *Kayaoka*, taken individually or in any combination, fail to teach, suggest, or motivate one of ordinary skill in the art to arrive at Claim 1, then Claim 4 is not obvious in view of the prior art of record, is patentably distinct, and is in condition for allowance.

Therefore, because *Kayaoka* taken alone or in combination with *Kameyama* and *Yoshikawa* does teach or suggest ALL of the limitations of **Claim 4** of the present application, the Applicant respectfully submits that the Examiner has not met the legally required burden of proving a prima facie case of obviousness. Accordingly, **Claim 4** is nonobvious in view of *Kameyama* and *Yoshikawa* in further view of *Kayaoka*, is patentably distinct over the prior art of record, and is in condition for allowance. Therefore, the rejection of **Claim 4** under **35 U.S.C. §103(a)** ought to now be withdrawn.

iii. **Rejection of Claims 10 and 11**

In the rejection of **Claims 10 and 11**, the Examiner contends that *Yagi* teaches (Col 3, lines 1 - 7 and lines 16 - 21) n- porous epitaxial silicon doped with antimony has excellent electron emissive properties. For the same reasons argued above for the **35 U.S.C. §103(a)** rejection of independent Claim 1, Claims 10 and 11 inherit all of the limitations of Claim 1. Because the cited combinations of *Kameyama* and *Yoshikawa* in further view of *Yagi*, taken individually or in any combination, fail to teach, suggest, or motivate one of ordinary skill in the art to arrive at Claim 1, then Claims 10 and 11 are not obvious in view of the prior art of record, are patentably distinct, and are in condition for allowance.

Therefore, because *Yagi* taken alone or in combination with *Kameyama* and *Yoshikawa* does teach or suggest ALL of the limitations of **Claims 10 and 11** of the present application, the Applicant respectfully submits that the Examiner has not met the legally required burden of proving a prima facie case of obviousness. Accordingly, **Claims 10 and 11** are nonobvious in view of *Kameyama* and *Yoshikawa* in further view

of *Yagi*, are patentably distinct over the prior art of record, and are in condition for allowance. Therefore, the rejection of **Claims 10 and 11** under **35 U.S.C. §103(a)** ought to now be withdrawn.

iv. **Rejection of Claim 14**

In the rejection of **Claim 14**, the Examiner contends that *Suzuki* teaches that for porous silicon carbide, the n-type heavily doped region **8** of the contact layer **5** can include dopant materials from the group consisting of nitrogen, phosphorus, and vanadium. For the same reasons argued above for the **35 U.S.C. §103(a)** rejection of independent Claim 1, Claim 14 inherits all of the limitations of Claim 1. Because the cited combinations of *Kameyama* and *Yoshikawa* in further view of *Suzuki*, taken individually or in any combination, fail to teach, suggest, or motivate one of ordinary skill in the art to arrive at Claim 1, then Claim 14 is not obvious in view of the prior art of record, is patentably distinct, and is in condition for allowance.

Therefore, *Suzuki* taken alone or in combination with *Kameyama* and *Yoshikawa* does teach or suggest ALL of the limitations of **Claim 14** of the present application, the Applicant respectfully submits that the Examiner has not met the legally required burden of proving a prima facie case of obviousness. Accordingly, **Claim 14** is nonobvious in view of *Kameyama* and *Yoshikawa* in further view of *Kayaoka*, is patentably distinct over the prior art of record, and is in condition for allowance. Therefore, the rejection of **Claim 14** under **35 U.S.C. §103(a)** ought to now be withdrawn.

CONCLUSION

For the reasons set forth above, the Applicant respectfully submits that each of the Claims presently in the application are nonobvious and patentably distinct over the prior art of record and are enabled by the Specification as filled. The Applicant respectfully requests that the Examiner withdraw the rejections and objections to the Claims as set forth in the Office Action mailed **08 May 2003** and requests the issuance of a Notice of Allowance such that the present application may timely issue as a U.S. patent.

AUTHORIZATION TO CHARGE FEES DUE TO HP PTO DEPOSIT ACCOUNT

Any fees due in response to the Office Action mailed **08 May 2003**, including any fees for Extensions of Time, are Authorized to be charged to the HP PTO Deposit Account Number: **08-2025**.

Respectfully submitted,

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